VOLTMETRIC DETERMINATION OF FIBRONIL USING GLASSY CARBON ELECTRODE AND APPLICATIONS

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Fipronil is a member insecticides called phenylpyrazoles. Its IUPAC name is 5-amino-1-[2,6-dichloro-4-(trifluoromethyl)phenyl]-4-[(trifluoromethyl)sulfinyl]-1H-pyrazole. Chemical structure of fipronil is shown in Scheme 1. Phenylpyrazole insecticide is used for the control of many soil and foliar insects (e.g., corn rootworm, beetles larvae, Colorado potato beetles and rice water weevils) on a variety of crops [1].

In this work, an electrochemical method has been developed for detection of fipronil using glassy carbon electrode. The oxidation behavior of insecticide fipronil was studied with different voltammetric techniques. Experiments were realized a wide range of pH 1.0-11.0 in buffer solutions and sulfuric acid. Optimization of the analytical method involved a systematic study of the experimental parameters that affect the Square Wave Voltammetric (SWV) response (Figure 2), such as frequency (f), pulse amplitude (a) and step potential (Eₘ). The peak currents obtained from voltammograms were linearly related to the insecticide concentration and the limit of detection (LOD) and quantification (LOQ) calculated for both standard and some real samples. The influence of some pesticides and various potentially interfering ions were also tested.

Reference


Scheme 1. Structure of fipronil.

Figure 1. Square wave voltammogram of 400 µg/L fipronil.